

CLAIMS

What is Claimed is:

1. A method for defining lighting for rendering a digital object, the method comprising:

5 reading image datasets each corresponding to a unique coordinate within a limited physical space, each image dataset comprising a plurality of correlated images captured at different exposures;

defining a plurality of panoramic maps, each panoramic map comprising a map of color and intensity information derived from images in a corresponding one of the
10 image sets; and

modeling a dynamic lighting model from the plurality of panoramic maps, the dynamic lighting model defining lighting for digital rendering as a function of virtual coordinates of a modeled space, wherein the modeled space corresponds to the limited physical space, and the virtual coordinates are selected from the group consisting of
15 space coordinates, time coordinates, and any combination of space and time coordinates.

2. The method of Claim 1, wherein the reading step further comprises reading the unique coordinate defining a location within the defined physical space, and wherein the modeling step further comprises defining the dynamic lighting model as a
20 function of the virtual coordinates that define different locations within the modeled space.

3. The method of Claim 1, wherein the reading step further comprises reading the unique coordinate defining a time at a selected location, and wherein the modeling step further comprises defining the dynamic lighting model as a function of the
25 virtual coordinates that define different times.

4. The method of Claim 1, wherein the modeling step further comprises modeling the dynamic lighting model as a time-independent function.

5. The method of Claim 1, wherein the modeling step further comprises modeling the dynamic lighting model as a time-dependent function.

5 6. The method of Claim 1, further comprising reading an image calibration dataset comprising images of a defined reference object linked to an identifier of a camera by which each image was captured.

7. The method of Claim 1, wherein the second reading step further comprises reading the image calibration dataset comprising images of the defined
10 reference object selected from a 20-step gray scale and a Macbeth color chart.

8. The method of Claim 1, further comprising color-correcting a plurality of images of the limited physical space based on an analysis of images of the defined reference object.

9. The method of Claim 1, wherein the defining step further comprises
15 defining the plurality of panoramic maps using the images of the defined reference object to determine characteristics of at least one camera.

10. The method of Claim 1, wherein the reading step further comprises reading the image datasets comprising images of a convex specularly-reflecting surface.

20 11. The method of Claim 1, wherein the modeling step further comprises modeling the dynamic lighting model comprising at least one modeled key light, and at least one modeled fill light.

12. The method of Claim 1, wherein the modeling step further comprises modeling the dynamic lighting model comprising an modeled light-emitting surface
25 surrounding a digital object to be rendered.

13. The method of Claim 12, wherein the modeling step further comprises subdividing the modeled light-emitting surface into surface regions based on a geometric relationship between a digital object to be rendered and the modeled light-emitting surface.

5 14. The method of Claim 1, wherein the modeling step further comprises interpolating an object-specific panorama from the plurality of panoramic maps.

15. The method of Claim 1, wherein the modeling step further comprises determining at least one modeled key light and at least one modeled fill light from the object-specific panorama.

10 16. A method for defining lighting for rendering a digital object, the method comprising:

reading at least one image dataset corresponding to a unique coordinate within a limited physical space, the image dataset comprising a plurality of correlated images captured at different exposures;

15 defining at least one panoramic map comprising a map of color and intensity information derived from images in a corresponding one of the image sets; and

modeling a lighting model from the panoramic map, the lighting model defining lighting for digital rendering as at least one modeled key light and at least one modeled fill light.

17. A computer-readable media containing instructions for defining lighting for rendering a digital object, the instructions comprising:

reading image datasets each corresponding to a unique coordinate within a limited physical space, each image dataset comprising a plurality of correlated images captured at different exposures;

defining a plurality of panoramic maps, each panoramic map comprising a map of color and intensity information derived from images in a corresponding one of the image sets; and

modeling a dynamic lighting model from the plurality of panoramic maps, the dynamic lighting model defining lighting for digital rendering as a function of virtual coordinates of a modeled space, wherein the modeled space corresponds to the limited physical space, and the virtual coordinates are selected from the group consisting of space coordinates, time coordinates, and any combination of space and time coordinates.

18. The computer-readable media of Claim 17, wherein the modeling instruction further comprises modeling the dynamic lighting model as a time-independent function.

19. The computer-readable media of Claim 17, wherein the modeling instruction further comprises modeling the dynamic lighting model as a time-dependent function.

20. The computer-readable media of Claim 17, further comprising an instruction for reading an image calibration dataset comprising images of a defined reference object linked to an identifier of a camera by which each image was captured.

21. The computer-readable media of Claim 20, further comprising an instruction for color-correcting a plurality of images of the limited physical space based on an analysis of images of the defined reference object.

22. The computer-readable media of Claim 20, wherein the defining instruction further comprises defining the plurality of panoramic maps using the images of the defined reference object to determine characteristics of at least one camera.

5 23. The computer-readable media of Claim 17, wherein the reading instruction further comprises reading the image datasets comprising images of a convex specularly-reflecting surface.

24. The computer-readable media of Claim 17, wherein the modeling instruction further comprises modeling the dynamic lighting model comprising at least one modeled key light, and at least one modeled fill light.

10 25. The computer-readable media of Claim 17, wherein the modeling instruction further comprises modeling the dynamic lighting model comprising a modeled light-emitting surface surrounding a digital object to be rendered.

15 26. The computer-readable media of Claim 25, wherein the modeling instruction further comprises subdividing the modeled light-emitting surface into surface regions based on a geometric relationship between a digital object to be rendered and the modeled light-emitting surface.

27. The computer-readable media of Claim 17, wherein the modeling step further comprises interpolating an object-specific panorama from the plurality of panoramic maps.

20 28. The computer-readable media of Claim 27, wherein the modeling instruction further comprises determining at least one modeled key light and at least one modeled fill light from the object-specific panorama.